THE FOLLOWING ARE THE ENGLISH TRANSLATION OF ANNEXES TO THE INTERNATIONAL PRELIMINARY EXAMINATION REPORT (ARTICLE 34):

Amended Sheets (Pages 4, 4/1, 6, 7, 7/1, 8, 8/1, 24, 25, 26, 27, 28, 28/1, and 28/2).

containing oxide according to a pattern shape of a mask by using a gaseous mixture of gas containing carbon and fluorine, oxygen gas and inert gas, wherein approximately vertically angled portions are formed in the silicon-containing oxide by an etching carried out under a condition that a ratio of a total flow rate of the gas containing carbon and fluorine and the oxygen gas to a flow rate of the inert gas ((a flow rate of the gas containing carbon and fluorine + a flow rate of the oxygen gas)/a flow rate of the inert gas) is smaller than or equal to 0.02.

Further, in the etching method of the present invention, the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) is smaller than or equal to 0.015.

Furthermore, in the etching method of the present invention, the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) is greater than or equal to 0.003.

Still further, in the etching method of the present invention, the inert gas is Ar.

gas) as a first value; and a second step of performing an etching by setting the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) as a second value smaller than the first value, wherein approximately vertically angled portions are formed in the silicon-containing oxide by etching.

Further, in the etching method of the present invention, the first value is greater than 0.02 and the second value is smaller than or equal to 0.02.

Furthermore, in the etching method of the present invention, the inert gas is Ar.

Still further, in the etching method of the present invention, the gas containing carbon and fluorine is C_5F_8.

In accordance with still another aspect of the invention, there is provided an etching apparatus for etching a silicon-containing oxide according to a pattern shape of a mask by using a gaseous mixture of gas containing carbon and fluorine, oxygen gas and inert gas, wherein approximately vertically angled portions are formed in the silicon-containing oxide by performing an etching while supplying the gaseous mixture having a ratio of a total flow rate of the gas containing carbon and fluorine and the oxygen gas to a flow rate of the inert gas ((a flow rate of

the gas containing carbon and fluorine + a flow rate of the oxygen gas)/a flow rate of the inert gas) smaller than or equal to 0.02.

Further, in the etching apparatus of the present invention, the supplied gaseous mixture has the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) smaller than or equal to 0.015.

Furthermore, in the etching apparatus of the present invention, the supplied gaseous mixture has the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) greater than or equal to 0.003.

Still further, in the etching apparatus of the present invention, the inert gas is Ar.

Additionally, in the etching apparatus of the present invention, the gas containing carbon and fluorine is C_5F_8.

Moreover, in the etching apparatus of the present invention, the etching apparatus includes an upper electrode and a lower electrode disposed to face the upper electrode, wherein the etching is performed by mounting an object to be processed having the silicon-containing oxide on the lower

electrode and then applying a high frequency power to the lower electrode.

Further, in the etching apparatus of the present invention, the silicon-containing oxide material is a silicon oxide film.

Furthermore, the etching apparatus of the present invention includes a magnetic field forming mechanism for forming a magnetic field approximately perpendicular to a high frequency electric field formed by the high frequency power.

Brief Description of the Drawings

Figs. 1A and 2B are drawings that illustrate a preferred embodiment of the present invention's etching method;

Fig. 2 shows a schematic configuration of an etching apparatus in accordance with the preferred embodiment of the present invention;

Fig. 3 are charts that illustrate the relations between $(C_5F_8+O_2)/Ar$ and etching rate, and between $(C_5F_8+O_2)/Ar$ and etching rate uniformity;

Fig. 4 is a chart that illustrates the relation between $(C_5F_8+O_2)/Ar$ and a microtrench coefficient;

Fig. 5 provides the relations between $(C_5F_8+O_2)/Ar$ and microtrench coefficient when the width of a trench is

What is claimed is:

1. An etching method for etching a silicon-containing oxide according to a pattern shape of a mask by using a gaseous mixture of gas containing carbon and fluorine, oxygen gas and inert gas,

wherein approximately vertically angled portions are formed in the silicon-containing oxide by an etching carried out under a condition that a ratio of a total flow rate of the gas containing carbon and fluorine and the oxygen gas to a flow rate of the inert gas ((a flow rate of the gas containing carbon and fluorine + a flow rate of the oxygen gas)/a flow rate of the inert gas) is smaller than or equal to 0.02.

2. The etching method of claim 1, wherein the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) is smaller than or equal to 0.015.

3. The etching method of claim 1, wherein the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and

fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) is greater than or equal to 0.003.

4. The etching method of claim 1, wherein the inert gas is Ar.

5. The etching method of claim 4, wherein the gas containing carbon and fluorine is C_5F_8.

6. The etching method of claim 1, wherein the etching is performed by mounting an object to be processed having the silicon-containing oxide on a lower electrode of an etching apparatus in which an upper electrode and the lower electrode are disposed to face each other and then applying a high frequency power to the lower electrode.

7. The etching method of claim 6, wherein the silicon-containing oxide is a silicon oxide film.

8. The etching method of claim 6, wherein the etching is performed while a magnetic field is formed approximately perpendicular to a high frequency electric field formed by the high frequency power.

9. An etching method for etching a silicon-containing oxide according to a pattern shape of a mask by using a

gaseous mixture of gas containing carbon and fluorine, oxygen gas and inert gas, the etching method comprising:

a first step of performing an etching by setting a ratio of a total flow rate of the gas containing carbon and fluorine and the oxygen gas to a flow rate of the inert gas ((a flow rate of the gas containing carbon and fluorine + a flow rate of the oxygen gas)/a flow rate of the inert gas) as a first value; and

a second step of performing an etching by setting the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) as a second value smaller than the first value,

wherein approximately vertically angled portions are formed in the silicon-containing oxide by etching.

10. The etching method of claim 9, wherein the first value is greater than 0.02 and the second value is smaller than or equal to 0.02.

11. The etching method of claim 9, wherein the inert gas is Ar.

12. The etching method of claim 9, wherein the gas

containing carbon and fluorine is C_5F_8.

13. An etching apparatus for etching a silicon-containing oxide according to a pattern shape of a mask by using a gaseous mixture of gas containing carbon and fluorine, oxygen gas and inert gas,

wherein approximately vertically angled portions are formed in the silicon-containing oxide by performing an etching while supplying the gaseous mixture having a ratio of a total flow rate of the gas containing carbon and fluorine and the oxygen gas to a flow rate of the inert gas ((a flow rate of the gas containing carbon and fluorine + a flow rate of the oxygen gas)/a flow rate of the inert gas) smaller than or equal to 0.02.

14. The etching apparatus of claim 13, wherein the supplied gaseous mixture has the ratio of the total flow rate of the gas containing carbon and fluorine and the oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) smaller than or equal to 0.015.

15. The etching apparatus of claim 13, wherein the supplied gaseous mixture has the ratio of the total flow rate of the gas containing carbon and fluorine and the

oxygen gas to the flow rate of the inert gas ((the flow rate of the gas containing carbon and fluorine + the flow rate of the oxygen gas)/the flow rate of the inert gas) greater than or equal to 0.003.

16. The etching apparatus of claim 13, wherein the inert gas is Ar.

17. The etching apparatus of claim 16, wherein the gas containing carbon and fluorine is C_5F_8.

18. The etching apparatus of claim 13, comprising an upper electrode and a lower electrode disposed to face the upper electrode, wherein the etching is performed by mounting an object to be processed having the silicon-containing oxide on the lower electrode and then applying a high frequency power to the lower electrode.

19. The etching apparatus of claim 18, wherein the silicon-containing oxide is a silicon oxide film.

20. The etching apparatus of claim 18, comprising a magnetic field forming mechanism for forming a magnetic field approximately perpendicular to a high frequency electric field formed by the high frequency power.